

EGYPTIAN REFINING COMPANY
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
ERC HYDRO-CRACKING COMPLEX PROJECT AT MOSTOROD
APPENDIX 12.10 – ENVIRONMENTAL MONITORING PLAN

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

ERC Hydro-Cracking Complex Project at Mostorod
FINAL VERSION

Appendix 12.10 – Environmental Monitoring Plan

51287-1

December 2008

Infrastructure and Environment

10th Floor
21, Misr Helwan Agriculture Road
Maadi, Cairo, Egypt
Telephone: +202 2359 5628 / 1487 / 1576 / 3819
Facsimile: +202 2359 1038
www.worleyparsons.com

© Copyright 2008 WorleyParsons Infrastructure and Environment Limited

**EGYPTIAN REFINING COMPANY
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
ERC HYDRO-CRACKING COMPLEX PROJECT AT MOSTOROD**

APPENDIX 12.10 – ENVIRONMENTAL MONITORING PLAN

CONTENTS

1.	MONITORING PLAN	1
1.1	Monitoring Rationale	1
1.2	Environmental Monitoring	2
1.2.1	Construction Phase Monitoring.....	2
1.2.2	Operation Phase Monitoring	6
1.3	Operational- and Management-Performance Monitoring	9
1.3.1	Documentation.....	9
1.3.2	Corrective/Preventative Action Results and Follow-up.....	9
1.4	Monitoring Work Plan.....	9
1.5	General recommendations.....	10

Tables

TABLE 1-1	SURFACE WATER PARAMETERS TO BE MONITORED	3
TABLE 1-2	GROUNDWATER PARAMETERS TO BE MONITORED	5
TABLE 1-3	MONITORING SUMMARY	11

**EGYPTIAN REFINING COMPANY
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
ERC HYDRO-CRACKING COMPLEX PROJECT AT MOSTOROD**

APPENDIX 12.10 – ENVIRONMENTAL MONITORING PLAN

1. MONITORING PLAN

The proposed monitoring programme set out in the following sections will be tailored by the Contractor during mobilisation to allow the plan to be appropriate, applicable and efficient. Specific sampling locations and monitoring frequency will be finalised based on the baseline information that has been obtained and discussions with ERC and EEAA. This will allow for the collection of meaningful data, which will permit the identification of source-pathway-receptor relationships.

The proposed monitoring programme is composed of two separate monitoring categories. These are:

- Environmental monitoring; and
- Operational and management performance monitoring.

The Contractor intends to assign an Environmental Control Supervisor (ECS) to the Project. One of the duties of the ECS will be to ensure that the monitoring programme/requirements are being properly implemented. The ECS will have a sufficient and appropriate environmental sampling/analysis and environmental management background.

1.1 Monitoring Rationale

The precise monitoring locations, media and frequency will be developed by the Contractor around the time of mobilisation. This plan presents an approach to environmental monitoring during construction and operation and will be integrated into the overall HSE procedures that the Contractor will implement and as such will be subject to review and modification following mobilisation.

The rationale for developing a programme of environmental monitoring must be driven by the source-pathway-receptor principle such that monitoring gauges the potential effects of the Project's operations on the environment and provides feedback so that operations can be amended where necessary so as not to cause environmental damage.

The basic range of media and parameters are presented here, but the location, frequency and type of monitoring will be fine-tuned following mobilisation and site familiarisation, such that linkages can be established. An example of this is surface water monitoring of the Ismailia Canal, which could be impacted by spillages of materials during construction. However, it will be necessary to ascertain possible linkages from the site to the canal, through such routes as formal or informal drains. There is little to be gained from monitoring canal water quality in the general vicinity of the site, as it is known that the canal is subject to a variety of point and non-point discharges throughout its length and therefore it would not be possible to correlate a recorded parameter value with the activities on site. Monitoring should therefore be conducted at the point of any discharge from the site. For the operational phase it is appropriate to monitor water quality directly upstream and downstream of the effluent discharge pipe to the canal from CORC/ERC, to evaluate potential effects.

**EGYPTIAN REFINING COMPANY
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
ERC HYDRO-CRACKING COMPLEX PROJECT AT MOSTOROD**

APPENDIX 12.10 – ENVIRONMENTAL MONITORING PLAN

The selection of monitoring parameters should take into consideration the potential nature of the materials that are used during construction, as there is little point or value for money in monitoring parameters for which the Project has no influence or control. The final suite of parameters will be agreed between the Contractor and ERC in liaison with the Financiers' advisors.

Although potentially difficult to ascertain the source of any contamination, monitoring of groundwater and surface water will nonetheless identify potential problems at an early stage and allow further investigation to be conducted. This could identify a leak within an ERC system and allow swift rectification of the problem, or allow ERC to demonstrate that the source of the contamination is an off-site, third party facility. Monitoring through the construction and operational phases therefore serves as an early warning system and should be considered as an essential component of a project's development and operation.

1.2 Environmental Monitoring

During the construction and the operational phases of the facility, an environmental monitoring programme will be implemented. This will include:

- Water resources:
 - Water from the Ismailia Canal;
 - Water from drains and irrigation canals in proximity to the facility; and
 - Groundwater.
- Air emissions;
- Noise levels;
- Solid and hazardous waste;
- Incoming and outgoing chemicals;
- Trucking and machinery activities; and
- Health risk/workspace monitoring (by ERC).

1.2.1 Construction Phase Monitoring

In the initial phases (construction and operational start-up), the environmental monitoring programme should aim to include as many of the parameters that were initially measured during the ESIA to allow comparison to the baseline established for the ESIA. The list of parameters can subsequently be reviewed and revised in relation to their significance and relevance to the specific site conditions and the nature of the activities and potential generation of polluting material.

**EGYPTIAN REFINING COMPANY
 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
 ERC HYDRO-CRACKING COMPLEX PROJECT AT MOSTOROD**

APPENDIX 12.10 – ENVIRONMENTAL MONITORING PLAN

Visual Inspection of Specific Locations/Activities

Certain locations/activities will require visual inspection and auditing in accordance with the specific Management Plans, to ensure that construction activities proceed in an environmentally sound manner. These will include:

- Workshops;
- Waste collection locations and wastewater storage tanks; and
- Material, fuels and oil storage locations.

Surface Water (Ismailia Canal) and Irrigation Canal Monitoring

During the construction phase, monitoring will be conducted to ensure that any potential adverse impacts on the water quality or sediment quality of the Ismailia Canal and/or irrigation canal due to construction activities are identified as quickly as possible to remedy any problem. An initial survey of topographic features and ongoing visual inspection will help to identify any incidents leading to direct or indirect discharges of wastes of any type into the Ismailia Canal and/or irrigation canal. Parameters to be sampled every two months during this phase are presented in Table 1-1. Samples should be taken at the point of any discharge into the receiving water body. This sampling will also verify the output of the upgraded CORC WWTU.

Table 1-1 Surface Water Parameters to be Monitored

Parameters		
pH	Iron (Fe)	Total Dissolved Solids (TDS)
Temperature (°C)	Manganese (Mn)	
Colour	Zinc (Zn)	Residual Chlorine
Suspended Matter or Total Suspended Solids (TSS)	Copper (Cu)	Silver (Ag)
DO	Lead (Pb)	Sulphide (S ₂)
Biological Oxygen Demand	Cadmium (Cd)	Total Coliform (TC) (probable number of TC/100 ml water)
Chemical Oxygen Demand	Chromium (Cr)	Hexavalent Chromium (Cr ⁶⁺)
Total Alkalinity	Mercury (Hg)	Phosphates (PO ₄)
Fluoride	Arsenic (As)	Nickel (Ni)

**EGYPTIAN REFINING COMPANY
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
ERC HYDRO-CRACKING COMPLEX PROJECT AT MOSTOROD**

APPENDIX 12.10 – ENVIRONMENTAL MONITORING PLAN

Parameters

Sulphate	Selenium (Se)	Benzo(a)pyrene
NO ₃	Oil and Grease	Phenols
NH ₃	Industrial Detergents	Turbidity
TON	Cyanide	

Groundwater Monitoring

During the construction phase, ongoing visual inspection will be conducted at all storage areas, workshops, water collection and wastewater storage tanks and other site areas to identify any incident and/or leak that could reach the groundwater. ERC shall be contacted in such cases.

Groundwater monitoring will comprise:

- **Groundwater level monitoring** in the four existing groundwater wells sampled and analysed in Chapter 5 of the main ESIA report. Monitoring will be conducted monthly using data loggers. The monitoring frequency can be decreased in future stages if the groundwater level remains stable over time. If additional wells are functional in the area during the monitoring scheme these groundwater levels will also be monitored monthly during the construction phase.
- **Groundwater quality monitoring** in the four existing groundwater wells sampled and analysed in Chapter 5 of the main ESIA report. The parameters to be monitored are presented in Table 1-2. The results will be compared to those presented in Chapter 5 to ensure compliance with relevant legislation. In the case of non-compliance ERC will be notified and immediate action taken.
- **Installation of new monitoring wells across the Project Area.** These wells will be installed in the upper and lower aquifers. A minimum of 3 monitoring wells will be required in each of the aquifers to allow groundwater gradient and flow direction to be calculated.

During each monitoring campaign, the groundwater level shall be measured in each well prior to sampling.

Weather conditions as well as sampling methodology (e.g. volume of well-water exchanged prior to taking a sample, sampling depth, etc.) may influence the analysis results of samples taken from the same well. To obtain reliable results, the ambient temperature will be recorded prior to each sampling round and all groundwater samples will be collected following the same methodology. To avoid soil and/or groundwater contamination due to sampling, contaminated groundwater extracted during sampling shall be disposed of appropriately.

**EGYPTIAN REFINING COMPANY
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
ERC HYDRO-CRACKING COMPLEX PROJECT AT MOSTOROD**

APPENDIX 12.10 – ENVIRONMENTAL MONITORING PLAN

Table 1-2 Groundwater Parameters to be Monitored

Parameters			
Nitrite	Cadmium	Zinc	Benzo(k)Fth
Nitrate	Chromium	cis-DCE	Benzo(b)Fth
Ammonium	Copper	trans-DCE	Benzo(a)Py
Phosphate	Iron (II)	TCE	Dibenzo(a,h)ant
Cyanide	Lead	PCE	IndenoPy
Sodium	Mercury	PCBs	Benzo(ghi)Pery
		Nap	Chlorinated
Arsenic	Nickel		Pesticides

Air Emissions

During the construction phase, ambient air quality will be monitored quarterly by active sampling and measurement for PM₁₀, SO₂, CO, toxic gases, NO_x (as NO₂) and ammonia at the same locations used during the baseline study.

The predicted facility contributions to air quality during operation are acceptable under industrial criteria (and are forecast to be positive). In view of the limited baseline data, a 1-year monitoring campaign should be completed at the start of construction to characterise air quality of the surrounding area. This should be in compliance with recommendations from the EU.

During construction of the facility, air emissions may result from fuel or oil burning due to equipment failure. Leakages should be checked by visual inspection at the start of every shift.

Noise Monitoring

Noise levels at the facility site during construction must comply with relevant national and international legislation. Site staff will monitor noise levels and take any remedial measures that prove necessary to reduce disturbance to nearby local residents. At locations with any ongoing pile-driving activities, noise levels shall be checked at least weekly (using a Type II sound level meter) whilst pile-driving activities are occurring. During operation, ambient noise will be monitored three times a year at the facility boundaries (three locations for the North plot and three locations for the South plot) and also at two locations in the nearby dwelling area on the public road. These locations will be selected from the array of locations assessed for noise levels conducted in this ESIA. At these locations, the noise level will be recorded for a 24-hour period using a Type I sound level meter (Precision Grade).

**EGYPTIAN REFINING COMPANY
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
ERC HYDRO-CRACKING COMPLEX PROJECT AT MOSTOROD**

APPENDIX 12.10 – ENVIRONMENTAL MONITORING PLAN

Solid and Hazardous Waste Monitoring

During the construction phase, waste will be handled and managed according to the Waste Management Plan. Monitoring is required to ensure proper implementation of the management plan. Solid and hazardous waste quantities and destination (final disposal) will be documented by the Contractor and the records handed over to ERC after commissioning, to demonstrate compliant handling and disposal.

Incoming and Outgoing Chemicals

Records will be kept and maintained for all incoming and outgoing hazardous chemicals. These records shall be reviewed regularly to check chemical consumption. An inventory of material safety data sheets for all chemicals on the site shall also be kept. Any new chemical proposed for purchase for the first time must be approved by the site ECS prior to the purchase.

Trucking and Machinery Activities

During the construction phase, trucking and machinery will be continuously monitored to avoid unnecessary use and check compliance with the Traffic Management Plan. Dust mitigation measures will be applied during the construction phase. Road and truck related accidents will be recorded.

Health Risk/Workplace Monitoring

Records of all health risk/workplace accidents will be documented and archived, in accordance with the Project HSE Plan developed by the Contractor. This should include “near miss”, “incident” and “accident”. A baseline medical check-up for all employees (prior to commencing employment) will be conducted.

1.2.2 Operation Phase Monitoring

Surface Water Monitoring (Drainage water into the Ismailia Canal and Irrigation Canal)

During operation, samples will be taken every two months at the point of any discharge into a receiving water body (Ismailia/irrigation canal), consistent with the construction phase monitoring. Should in-line monitoring be built-in to the waste treatment facilities, this will form the monitoring location. Samples within the Ismailia Canal will also be taken upstream and downstream of the discharge location.

Groundwater Monitoring

Groundwater monitoring during the operation phase is part of the continuous QA/QC procedures for the facility and will be subject to ongoing inspection. This will be conducted at the same wells

**EGYPTIAN REFINING COMPANY
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
ERC HYDRO-CRACKING COMPLEX PROJECT AT MOSTOROD**

APPENDIX 12.10 – ENVIRONMENTAL MONITORING PLAN

and follow the same methodology used during the construction phase (including the newly installed wells). The monitoring wells shall be sampled and analysed for the parameters mentioned in the construction phase to ensure compliance with relevant legislation. In the case of non-compliance ERC will be notified and immediate action taken.

The following laboratories may be involved in the analyses for the monitoring programme:

- Suez Canal University Laboratories; and
- Greater Cairo water Company, Central Water Quality Laboratory.

All laboratory facilities will be audited by ERC for preliminary approval. Audits will include inspection of equipment, equipment calibration certificates, utilised chemical expiry dates, field sampling and onsite measurement equipment (if applicable), procedures/methodologies and data management systems. All samples should be properly preserved, in accordance with approved standard methods, and accompanied with completed and signed chain-of-custody forms all through the sampling and analysis procedures. In addition, duplicates of all samples should be temporarily stored until the original samples are analysed.

Air Emissions

The monitoring regime and parameters for ambient air quality during the operation phase are the same as during construction.

Additionally, stacks and vents will be monitored during operation. At this stage the arrangements for automatic, operational monitoring by installed equipment is not known. Air emissions will be visually monitored for opacity at least once per day to detect any equipment failure.

Emissions from stacks and vents will be monitored by active sampling and measurement of PM₁₀, SO₂, CO, CO₂, H₂S, hydrocarbons, NO_x (as NO₂), ammonia and volumetric flow rate. The location of the sampling point will be at the stack (sampling port 1-inch diameter). Emissions from stacks and vents must comply with the most stringent legislative criteria for emissions as detailed in Chapter 3 of this report.

Noise Monitoring

Noise levels during operation of the facility will be monitored on a quarterly basis at the same locations and by the same method as during construction. This frequency of noise measurement will be only for the first year of operation after which, if no adverse impacts are noted, the monitoring frequency can be reduced. Limits set for noise levels by relevant legislation (Chapter 3 of this report) will be met.

Solid and Hazardous Waste Monitoring

Records will be kept and maintained to record the amounts of produced wastes, transportation routes and final reuse/disposal. During the operational phase, waste should be handled according

**EGYPTIAN REFINING COMPANY
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
ERC HYDRO-CRACKING COMPLEX PROJECT AT MOSTOROD**

APPENDIX 12.10 – ENVIRONMENTAL MONITORING PLAN

to the approach described in the Waste Management Plan (included in Appendix 12). Monitoring is required to ensure proper implementation of the management plan. Solid and hazardous waste quantities and destination (final disposal) will be documented and kept to ensure proper handling and disposal.

Incoming and Outgoing Chemicals

Records will be kept and maintained for all incoming and outgoing hazardous chemicals. Records will be reviewed regularly to check chemical consumption. An inventory of material data sheets for all chemicals on the site will also be kept. Any new chemical proposed for purchase for the first time must be approved by the site Environmental Officer/HSE department prior to the purchase.

Trucking and Machinery Activities

During the operational phase, trucking and machinery will be continuously monitored to avoid unnecessary use. Road- and truck-related accidents will be recorded.

Occupational Noise

It is required that the levels of occupational noise comply with relevant legislation for noise levels inside the workplace (Annex 7 of the executive regulations of Egyptian Law 4 and IFC occupational health and safety guidelines). Occupational noise levels inside the work place will be monitored weekly using Type II noise equipment. If new operations are undertaken, more frequent noise monitoring may be needed. Areas with high noise levels will need regular occupational monitoring for workers.

Air Quality/Ventilation inside the Workplace

The air quality inside the work place must comply with Egyptian criteria - Annex 8 of executive regulations of Law 4, plus IFC health and safety standards.

Precautions must be implemented to ensure no violation of relevant legislation (Egyptian criteria - Annex 8 of executive regulations of Law 4 and IFC health and safety standards). A list of mitigation measures to accomplish this are listed in the ESIA. Included in these measures are:

- Periodic (not less than monthly) tuning of equipment;
- Mechanical ventilation systems are to be maintained in good working order;
- Point-source exhaust systems must have local indicators of correct functioning;
- Re-circulation of contaminated air is not acceptable; and
- Air inlet filters must be regularly cleaned and maintained.

**EGYPTIAN REFINING COMPANY
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
ERC HYDRO-CRACKING COMPLEX PROJECT AT MOSTOROD**

APPENDIX 12.10 – ENVIRONMENTAL MONITORING PLAN

Temperature inside the Workplace

This parameter shall be recorded during the operational phase and must comply with relevant legislation (Egyptian criteria - Annex 9 of executive regulations of Law 4/ IFC health and safety criteria).

Employee's Health Condition/Accidents

A baseline check-up for all employees (prior to commencement of employment) must be carried out. Medical check-ups will be carried out periodically and the results documented and stored. Accidents will be recorded and records reviewed regularly. Cleanliness and tidiness will be subject to permanent individual monitoring.

1.3 Operational- and Management-Performance Monitoring

A monitoring programme to ensure that all data are documented and interpreted will be applied. Also, where corrective action is required, monitoring to ensure these are followed up and implemented will be employed.

1.3.1 Documentation

The documentation system (including logbooks and internal/external communication documentation) and an environmental register will be regularly checked (bi-monthly) and updated (daily). Monitoring results shall also be available to be presented to responsible authorities, as required. Upon discovery of any data gaps, corrective actions shall be undertaken and documented.

1.3.2 Corrective/Preventative Action Results and Follow-up

Forms will be available for corrective action requirements and corrective action follow-ups. Any such documentation system will be structured so as to be ISO 9000: 2000 certification-capable.

1.4 Monitoring Work Plan

This section describes the tasks required to fulfil the monitoring requirements.

A list of tasks is presented below:

- Review the monitoring plan.
- Set a start date and then adjust all following dates to fit the monitoring schedule.
- Keep copies of the monitoring plan in areas relevant to sampling locations.
- Review locations, monitoring parameter lists and activities (sampling, analysis, etc.).
- Clearly mark the monitoring locations on site plans.

**EGYPTIAN REFINING COMPANY
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
ERC HYDRO-CRACKING COMPLEX PROJECT AT MOSTOROD**

APPENDIX 12.10 – ENVIRONMENTAL MONITORING PLAN

- Conduct (or supervise) the required sampling and analysis.
- Record any site remarks observed whilst sampling and/or analysing.
- Based on site remarks and data interpretation, determine non-conformances and requirements for corrective actions, if any.
- Where non-conformances are detected, propose, document and follow-up on corrective actions (weekly).
- For each monitoring round, prepare a report including:
 - Findings of the monitoring programme and data interpretation.
 - Status of corrective and preventative actions.
 - Remarks and recommendations.
 - Monitoring activities and dates for the coming round.
- During each monitoring round, examine previous monitoring results and based on the parameter analyses levels, decide on any future additions or reductions in monitoring parameters and frequencies accordingly.

1.5 General recommendations

- It is advised that qualified individuals implement the monitoring programme and train local representatives.
- It is recommended that sample analyses be conducted by a third-party accredited laboratory to ensure that impartial, objective data are produced.
- All locations must be accurately geo-referenced.

A monitoring summary is provided in Table 1-3. The responsible party for conducting the monitoring during the construction phase is the Contractor. During operations, ERC will be responsible for conducting the monitoring.

**EGYPTIAN REFINING COMPANY
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
ERC HYDRO-CRACKING COMPLEX PROJECT AT MOSTOROD**

APPENDIX 12.10 – ENVIRONMENTAL MONITORING PLAN

Table 1-3 Monitoring Summary

Project Phase	Monitoring Category	Monitoring Regime	Action Upon Non-Compliance
Construction	Surface water (Ismailia Canal and drains/irrigation canals)	<p>Ongoing visual inspection.</p> <p>Water sampling to be conducted every two months at the point of any discharge.</p> <p>Parameters in Chapter 3: Policy, Legal and Administrative Framework, Table 3-6.</p>	<p>Corrective/preventative action to be taken including further monitoring/investigation in order to locate the cause of the non-compliance. Non-compliance to be documented together with proposed actions and follow-up procedures/results.</p>
	Groundwater	<p>Ongoing visual inspection.</p> <p>Monthly groundwater table monitoring according to the findings of the baseline study (the ESIA); groundwater table measurements in all wells before sampling.</p> <p>Monitoring for parameters presented in Chapter 3: Policy, Legal and Administrative Framework, Table 3-8.</p> <p>Ongoing monitoring frequency to be determined according to the findings the final ESIA of baseline study.</p>	<p>Corrective/preventative action to be taken including further monitoring/investigation in order to locate the cause of the non-compliance. Non-compliance to be documented together with proposed actions and follow-up procedures/results.</p>

**EGYPTIAN REFINING COMPANY
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
ERC HYDRO-CRACKING COMPLEX PROJECT AT MOSTOROD**

APPENDIX 12.10 – ENVIRONMENTAL MONITORING PLAN

Project Phase	Monitoring Category	Monitoring Regime	Action Upon Non-Compliance
	Air emissions	<p>Air Quality: quarterly monitoring by active sampling and annually by passive sampling, both for the same parameters as in the baseline study (ESIA).</p> <p>One-year continuous monitoring to be completed to establish baseline characteristics.</p> <p>Ongoing daily visual inspection for fuel-burning equipment failure. Weekly monitoring using leak-detection equipment.</p>	<p>Corrective/preventative action to be taken including further monitoring/investigation in order to locate the cause of the non-compliance.</p> <p>Faulty equipment to be repaired/replaced.</p> <p>Non-compliance to be documented together with proposed actions and follow-up procedures/results.</p>
	Noise levels	<p>Monitoring three times a year for ambient noise, at seven site boundary locations and two dwelling areas to be selected from the array of locations surveyed during the baseline assessment. Monitoring to be conducted for 24 hours using a type 1 noise level meter.</p> <p>Regular checks at least quarterly for areas in proximity to equipment usage and regular checks at least weekly during pile-driving activities.</p>	<p>Corrective/preventative action to be taken including further monitoring/investigation in order to locate the cause of the non-compliance. Non-compliance to be documented together with proposed actions and follow-up procedures/results.</p>
	Solid and hazardous waste	<p>Records to be kept and maintained. Compliance with waste management plan to be monitored.</p>	<p>Non-compliance to be documented together with proposed actions and follow-up procedures/results.</p>

**EGYPTIAN REFINING COMPANY
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
ERC HYDRO-CRACKING COMPLEX PROJECT AT MOSTOROD**

APPENDIX 12.10 – ENVIRONMENTAL MONITORING PLAN

Project Phase	Monitoring Category	Monitoring Regime	Action Upon Non-Compliance
	Incoming and outgoing chemicals	Records to be kept and maintained.	Non-compliance to be documented together with proposed actions and follow-up procedures/results.
	Trucking and machinery activities	Records to be kept and maintained.	Non-compliance to be documented together with proposed actions and follow-up procedures/results.
	Health risk / workplace	Records to be kept and maintained. Weekly monitoring for occupational noise levels using type II equipment. Daily monitoring for workplace temperature. .	Corrective/preventative action to be taken including further monitoring/investigation in order to locate the cause of the non-compliance. Non-compliance to be documented together with proposed actions and follow-up procedures/results.
Operation By ERC	Surface water (Ismailia Canal and drains/irrigation canals)	Sampling every two months at the point of any discharge. In addition, samples to be taken upstream and downstream of the discharge point in the Ismailia Canal. Same parameters as for the construction phase.	Corrective/preventative action to be taken including further monitoring/investigation in order to locate the cause of the non-compliance. Non-compliance to be documented together with proposed actions and follow-up procedures/results.

**EGYPTIAN REFINING COMPANY
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
ERC HYDRO-CRACKING COMPLEX PROJECT AT MOSTOROD**

APPENDIX 12.10 – ENVIRONMENTAL MONITORING PLAN

Project Phase	Monitoring Category	Monitoring Regime	Action Upon Non-Compliance
	Groundwater	Same as for the construction phase; frequency may differ depending on the findings of the ESIA baseline study.	Corrective/preventative action to be taken including further monitoring/investigation in order to locate the cause of the non-compliance. Non-compliance to be documented together with proposed actions and follow-up procedures/results.
	Air emissions	Ambient air quality monitoring similar to the construction phase. At least monthly monitoring by active sampling for stacks and vents; real time monitoring is recommended. Daily visual monitoring of emission opacity, which could help to identify equipment failure.	Corrective/preventative action to be taken including further monitoring/investigation in order to locate the cause of the non-compliance. Non-compliance to be documented together with proposed actions and follow-up procedures/results.

**EGYPTIAN REFINING COMPANY
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
ERC HYDRO-CRACKING COMPLEX PROJECT AT MOSTOROD**

APPENDIX 12.10 – ENVIRONMENTAL MONITORING PLAN

Project Phase	Monitoring Category	Monitoring Regime	Action Upon Non-Compliance
	Noise levels	Quarterly monitoring with the same methodology and frequency, and at the same locations used during the construction phase monitoring. Frequency might be reduced if proven to be complying with the guidelines during the first year of operation	Corrective/preventative action to be taken including further monitoring/investigation in order to locate the cause of the non-compliance. Non-compliance to be documented together with proposed actions and follow-up procedures/results.
	Solid and hazardous waste	Records to be kept and maintained.	Non-compliance to be documented together with proposed actions and follow-up procedures/results.
	Incoming and outgoing chemicals	Records to be kept and maintained.	Non-compliance to be documented together with proposed actions and follow-up procedures/results.
	Trucking and machinery activities	Records to be kept and maintained.	Non-compliance to be documented together with proposed actions and follow-up procedures/results.

**EGYPTIAN REFINING COMPANY
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
ERC HYDRO-CRACKING COMPLEX PROJECT AT MOSTOROD**

APPENDIX 12.10 – ENVIRONMENTAL MONITORING PLAN

Project Phase	Monitoring Category	Monitoring Regime	Action Upon Non-Compliance
	Health risk / workplace	Records to be kept and maintained. Weekly monitoring for occupational noise using type II equipment. Daily monitoring for workplace temperature. Medical check-up records to be kept and maintained.	Corrective/preventative action to be taken including further monitoring/investigation in order to locate the cause of the non-compliance. Non-compliance to be documented together with proposed actions and follow-up procedures/results.